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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/532,022	03/21/2000	Yuji Sudoh	35.G2558	7470

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EXAMINER

NGUYEN, HUNG

ART UNIT PAPER NUMBER

2851

DATE MAILED: 12/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/532,022

Applicant(s)

SUDOH ET AL.

Examiner

Hung Henry V Nguyen

Art Unit

2851

NW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on RCE filed 9/10/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 25-52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 March 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 15. 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 2, 2003 has been entered.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 49-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ota (U.S.Pat. 6,406,820) in view of Ushida et al (U.S.Pat. 5,530,518) and further in view of Shiraishi (U.S.Pat. 6,020,950).

With regard to claims 49-52, Ota discloses an exposure apparatus for performing exposure using X-rays/or EUV in a vacuum including a projection optical system for projecting a patterned formed on a reticle onto a substrate (see col.3, lines 20-34 and fig.1). Ota lacks to show a diaphragm. Ushida et al (fig.1) discloses an projection exposure apparatus comprising: a projection optical system (10) for projection a pattern formed on a reticle (9) onto a

Art Unit: 2851

photosensitive substrate (11) and a diaphragm (10a) for setting the numerical aperture of the projection optical system. Ota as modified by Ushida lacks to show a mechanism for controlling the temperature of the diaphragm. Shiraishi (figs 4 and 5) teaches a projection optical system having a cooling member (see fig.5) for cooling the light shielding plate arranged therein whereby "the system is free from heat generation caused by light absorption" (see col.5, lines 15-18) wherein the cooling means comprises a cooling fluid circulation system (Ko,Ki). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Ota, Ushida and Shiraishi to obtain the invention as specified in claims 49-52. It would have been obvious to a skilled artisan at the time the invention was made to provide the exposure apparatus using X-rays or EUV of Ota with the diaphragm as taught by Ushida for setting the numerical aperture of the projection optical system and to utilize the cooling means as taught by Shiraishi into the diaphragm of Ushida so that the numerical aperture diaphragm may be prevented from increasing its temperature due to absorption of light and thus a deviation of the projection optical system is prevented whereby the quality of the images to be printed is greatly improved.

3. Claims 25-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al (U.S.Pat. 4,475,223) in view of Ushida et al (U.S.Pat. 5,530,518) and further in view of Shiraishi (U.S.Pat. 6,020,950) and further in view of Sato (U.S.Pat. 5,142,148)

With regard to claims 25-48 Taniguchi et al discloses an exposure apparatus for performing exposure using X-rays (6) in a vacuum (2) (see col.4, lines 9-11) and comprising a projection optical system for projecting a predetermined pattern formed on a mask onto a

Art Unit: 2851

substrate (see fig.4). Taniguchi lacks to show “a diaphragm arranged in vacuum and a cooling device which cools the diaphragm”. Ushida et al (fig.1) discloses an projection exposure apparatus having a projection optical system (10) for projection a pattern formed on a reticle (9) onto a photosensitive substrate (11) and a diaphragm (10a) for setting the numerical aperture of the projection optical system. Shiraishi (figs 4 and 5) teaches a projection optical system having a cooling member (see fig.5) for cooling the light shielding plate arranged therein whereby “the system is free from heat generation caused by light absorption” (see col.5, lines 15-18) wherein the cooling means comprises a cooling fluid circulation system (Ko,Ki). Sato discloses an exposure apparatus where the aperture diaphragm is disposed in a vacuum for preventing from being contaminated (see col.2, lines 3-16). In view of such teachings, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Taniguchi, Ushida, Shiraishi and Sato to obtain the claimed invention.

With respect to claims 31 and 43, it is noted that the temperature of fluid is controlled (see col.14, lines 5-7). Therefore, a temperature sensor is an inherent device of the cooling means to detect the temperature information of the light shielding plate.

As to claims 32-33, and 44-45, it is the examiner's position that it would have been obvious to a skilled artisan to preferably disposed the temperature sensor on the side facing the substrate. In other words, the sensor is disposed on a plane opposite to the light source whereby the sensor is not influenced by the exposure beam.

It would have been obvious to a skilled artisan to employ a diaphragm as taught by Ushida into the exposure device of Taniguchi for adjusting the numerical aperture thereby improving the resolution of the images to be printed and to utilize the cooling means as taught by

Art Unit: 2851

Shiraishi into the diaphragm of Ushida so that the numerical aperture diaphragm may be prevented from increasing its temperature due to absorption of light and thus a deviation of the projection optical system can be avoided and to place the diaphragm in a vacuum as suggested by Sato so that the diaphragm is prevented from damage caused by contamination.

4. Claims 34-35 and 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi in view of Ushida et al (U.S.Pat. 5,530,518) and further in view of Shiraishi (U.S.Pat. 6,020,950) and further in view of Sato and further in view of Nishi et al (U.S.Pat. 5,894,341).

As to claims 34-35, and 46-47, Taniguchi as modified by Ushida, as well as Shiraishi and Sato comprising substantially of the limitations of the instant invention as discussed above except for the aperture diaphragm comprises an iris diaphragm and a turret having a plurality of openings. However, a variable aperture of a turret type is known per se. For instance, Nishi teaches an aperture comprising "iris diaphragm and a turret with a plurality of openings". (see figs.2a, 2b). It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a variable aperture of a turret type as taught by Nishi in the device of Ushida as modified by Shiraishi and Sato for varying the numerical aperture of the projection optical system.

As to claims 30 and 42, Taniguchi as modified by Ushida et al, Shiraishi and Sato lacks to show a cooling device with a "Peltier element". Using a "Peltier element" in a cooling mechanism is also well known in the art. For example, Nishi teaches Peltier element (30) for cooling the bottom face of the temperature adjustment plate (20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ "Peltier element" as taught by Nishi into the cooling device of Shiraishi for the purpose of cooling the

Art Unit: 2851

aperture stop and thus the aperture stop can be prevented from increasing its temperature due to absorption of light.

***Response to Amendment/Arguments***

5. Applicant's amendment filed August 5, 2003 have been entered. In response to applicant's arguments against the references individually, it has been held that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Applicant's arguments with respect to the prior art rejection have been carefully reviewed but have been traversed in view of the rejections set forth above.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Henry V Nguyen whose telephone number is 703-305-6462. The examiner can normally be reached on Monday-Friday (First Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams can be reached on 703-308-2847. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

hvn  
12/4/03

  
**HENRY HUNG NGUYEN**  
**PRIMARY EXAMINER**